

EXHIBIT 12

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF WEST VIRGINIA

IN RE NATIONAL	:	CIVIL ACTION NO.
PRESCRIPTION OPIATE	:	3:17-01362
LITIGATION	:	
Cabell County Commission	:	and
and City of Huntington, WV	:	
	:	CIVIL ACTION NO.
	:	3:17-01665

EXPERT REPORT OF CRAIG J. MCCANN, PH.D., CFA

August 3, 2020

103. Table 28 lists the Dispensers that McKesson shipped oxycodone and hydrocodone to in Cabell County and the City of Huntington, WV.

Table 28 McKesson Oxycodone and Hydrocodone Shipments to Dispensers in Dosage Units, 2006-2014

Dispenser Name	Oxycodone	Hydrocodone	Total	%
Rite Aid	2,396,440	843,040	3,239,480	14%
Target Stores	140,800	500,270	641,070	3%
Wal-Mart	21,300	143,860	165,160	1%
Kroger	0	3,800	3,800	0%
Walgreen Co	0	3,000	3,000	0%
Other Chain Pharmacy	0	0	0	0%
Chain Pharmacy Total	2,558,540	1,493,970	4,052,510	18%
Retail Pharmacy	305,320	141,730	447,050	2%
Closed Door Pharmacy	187,400	560,200	747,600	3%
Mail Order Pharmacy	154,300	500	154,800	1%
Other Dispensers	12,078,180	5,673,570	17,751,750	77%
Grand Total	15,283,740	7,869,970	23,153,710	100%

VII. Flagged Distributor Defendants Transactions

104. I implemented various approaches to identify transactions meeting specified criteria using the non-public ARCOS Data from 2006 to 2014, supplemented with Defendants' Transactional Data where the ARCOS Data is obviously missing but are included in the transactions produced by Distributor Defendants in discovery and to the extent I have Defendants' Transactional Data for the periods before 2006 and after 2014. I calculated the results separately for each of twelve controlled substance drug codes.³⁷

³⁷ I do not analyze transactions in two treatment drugs: buprenorphine and methadone.

A. Method 1: Maximum Monthly, Trailing Six-month Threshold

105. Under the first approach, I identify transactions that cause the number of Dosage Units shipped by a Distributor Defendant to a pharmacy in a calendar month to exceed the highest number of Dosage Units shipped by the Distributor Defendant to the pharmacy in any one of the six preceding calendar months.³⁸ For example, if the number of Dosage Units containing hydrocodone shipped from a Distributor Defendant to a pharmacy in February, March, April, May, June, and July was 5,000; 10,000; 7,000; 8,000; 9,000; and 9,500 respectively, a requested transaction in August would be flagged if it would cause the number of Dosage Units containing hydrocodone the Distributor Defendant shipped to the pharmacy to exceed 10,000. Any reported transactions containing hydrocodone on that date and all reported transactions containing hydrocodone from that Distributor Defendant to that pharmacy thereafter are flagged.

³⁸ In this approach and the others implemented below (with the exception of Method 2: Trailing Six-month Maximum Monthly, Fixed After First Triggered Threshold) my calculation is based on the entire shipment of this Distributor Defendants, not of individual Distribution Center.

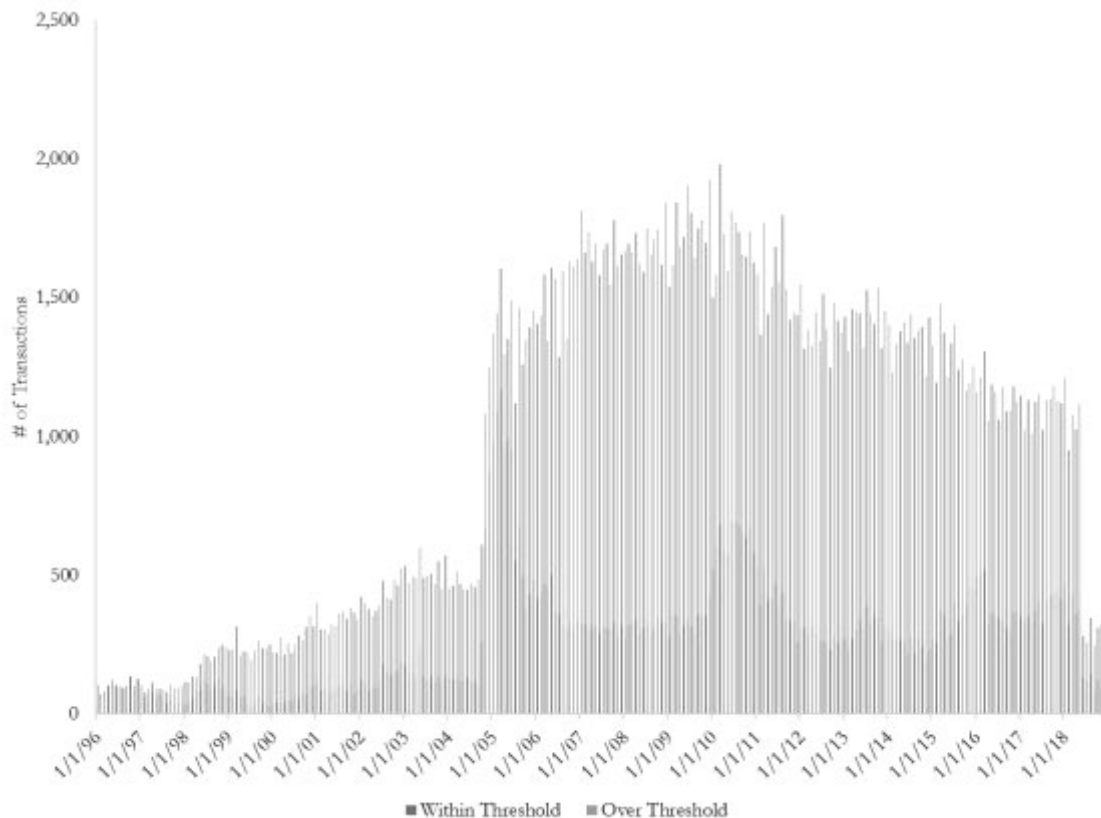
106. Table 29 reports Total MME and % of Total MME in transactions flagged in Cabell County and the City of Huntington, WV using the Trailing Six-Month Maximum Threshold.

Table 29 Trailing Six-Month Maximum Threshold Flagged Transactions, Cabell County and the City of Huntington, WV, Total MME and % MME

Year	Defendants' Total MME	Flagged MME	%
1996	3,676,079	3,420	0.1%
1997	2,971,440	1,593,871	53.6%
1998	5,628,469	2,903,431	51.6%
1999	9,748,424	7,090,993	72.7%
2000	13,277,798	10,055,886	75.7%
2001	16,011,946	11,090,098	69.3%
2002	20,776,512	13,782,638	66.3%
2003	24,095,532	16,775,991	69.6%
2004	33,812,841	16,742,681	49.5%
2005	88,976,826	36,047,335	40.5%
2006	101,663,192	75,807,024	74.6%
2007	106,658,684	83,086,310	77.9%
2008	113,665,454	86,871,826	76.4%
2009	128,134,351	101,592,902	79.3%
2010	134,446,855	88,948,942	66.2%
2011	123,822,352	95,754,631	77.3%
2012	98,917,207	78,017,593	78.9%
2013	86,041,530	62,996,586	73.2%
2014	88,675,236	67,936,969	76.6%
2015	88,769,151	63,922,004	72.0%
2016	68,217,935	45,441,503	66.6%
2017	49,205,864	32,127,807	65.3%
2018	24,161,252	14,767,536	61.1%
Total	1,431,354,928	1,013,357,980	70.8%

107. Figure 8 illustrates total opioid transactions from Distributor Defendants to retail and chain pharmacies into Cabell County and the City of Huntington, WV from 1996 to 2018 and those transactions which would be flagged by the Trailing Six-Month Maximum Threshold methodology. The Trailing Six-Month Maximum Threshold methodology flags 71.9% of transactions accounting for 87.0% of Dosage Units, 70.8% of MME and 85.0% of drug weight shipped into Cabell County and the City of Huntington, WV. Additional charts and tables reflecting the result of applying this methodology and the methodologies below to each Distributor Defendant are in Appendix 7.

Figure 8 Trailing Six-Month Maximum Threshold Flagged Transactions, Cabell County and the City of Huntington, WV 1996 to 2018



108. Table 30 summarizes the transactions flagged based on the Trailing Six-Month Maximum Threshold Approach in Cabell County and the City of Huntington, WV.

Table 30 Trailing Six-Month Maximum Threshold Flagged Transactions, Cabell County and the City of Huntington, WV 1996 to 2018

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total
AmerisourceBergen Drug	28,821	39,960	6,080	363	2,175	3,493	80,892
Cardinal Health	47,104	31,744	8,824	1,263	2,273	4,059	95,267
McKesson Corporation	7,900	7,188	953	35	225	323	16,624
Total	83,825	78,892	15,857	1,661	4,673	7,875	192,783

B. Method 2: Trailing Six-month Maximum Monthly, Fixed After First Triggered Threshold

109. Under the second approach, when a transaction causes the number of dosage units shipped to a pharmacy in a month to exceed the highest number of dosage units shipped to the pharmacy in any one of the six preceding months, the dosage units of highest month in the preceding six months becomes threshold which is then applied in all subsequent months. For example, if the number of Dosage Units containing hydrocodone shipped from a Distributor Defendant to a pharmacy in February, March, April, May, June, and July was 5,000; 10,000; 7,000; 8,000; 9,000; and 9,500 respectively, a requested transaction in August would be flagged if it would cause the number of Dosage Units containing hydrocodone the Distributor Defendant shipped to the Pharmacy to exceed 10,000. Any reported transactions containing hydrocodone on that date and to the month-end from that

Distributor Defendant to that pharmacy are flagged. This 10,000 Dosage Units number becomes the fixed monthly hydrocodone limit of this pharmacy thereafter and the excess, if any, of the pharmacy's monthly receipt in excess of 10,000 is flagged.

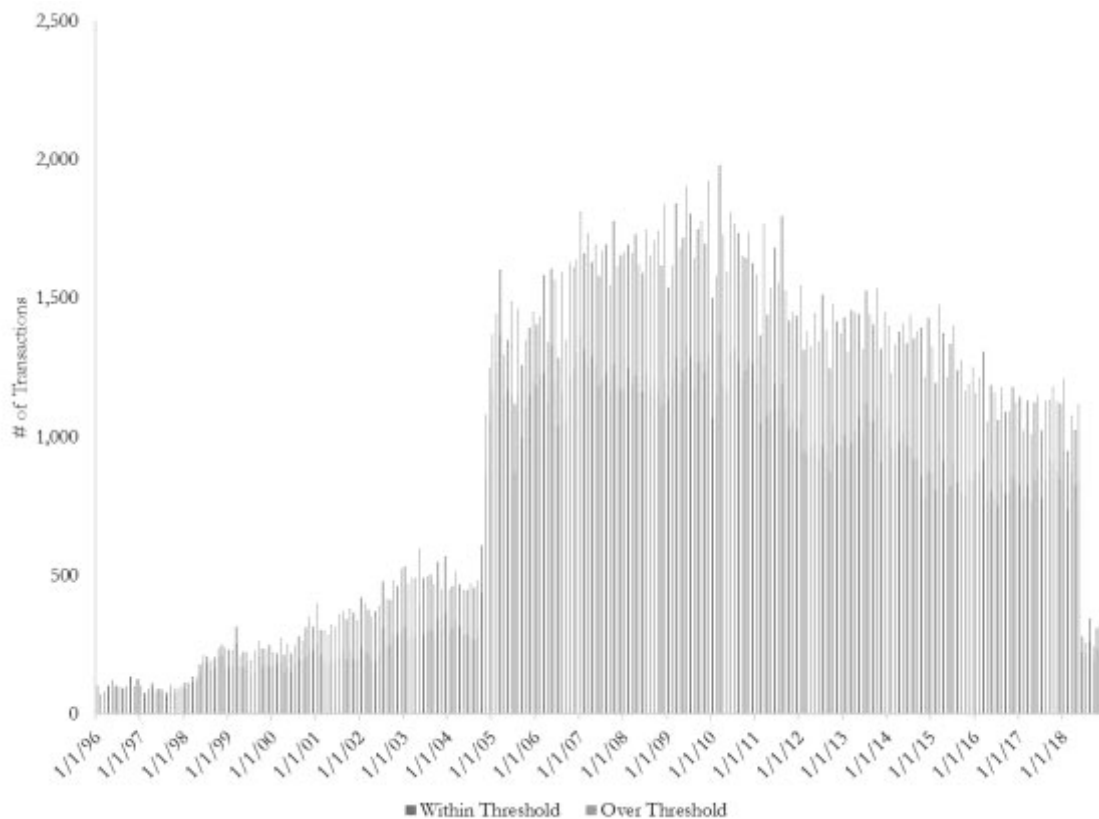
110. Table 31 reports Total MME and % of Total MME in transactions flagged in Cabell County and the City of Huntington, WV using the Trailing Six-Month Maximum, Fixed After Triggered Threshold.

Table 31 Trailing Six-Month Maximum, Fixed After Triggered Threshold Flagged Transactions, Cabell County and the City of Huntington, WV, Total MME and % MME

Year	Defendants' Total MME	Flagged MME	%
1996	3,676,079	3,420	0.1%
1997	2,971,440	312,675	10.5%
1998	5,628,469	997,240	17.7%
1999	9,748,424	2,731,685	28.0%
2000	13,277,798	5,514,927	41.5%
2001	16,011,946	7,606,045	47.5%
2002	20,776,512	10,267,103	49.4%
2003	24,095,532	11,100,720	46.1%
2004	33,812,841	10,324,445	30.5%
2005	88,976,826	17,192,783	19.3%
2006	101,663,192	23,371,988	23.0%
2007	106,658,684	28,493,906	26.7%
2008	113,665,454	33,981,741	29.9%
2009	128,134,351	41,690,495	32.5%
2010	134,446,855	43,889,971	32.6%
2011	123,822,352	43,667,286	35.3%
2012	98,917,207	43,727,403	44.2%
2013	86,041,530	29,570,696	34.4%
2014	88,675,236	32,701,298	36.9%
2015	88,769,151	33,657,518	37.9%
2016	68,217,935	21,249,246	31.1%
2017	49,205,864	13,490,556	27.4%
2018	24,161,252	5,795,757	24.0%
Total	1,431,354,928	461,338,903	32.2%

111. Figure 9 illustrates total opioid transactions from Distributor Defendants to retail and chain pharmacies into Cabell County and the City of Huntington, WV from 1996 to 2018 and those transactions which would be flagged by the Trailing Six-Month Maximum, Fixed After Triggered Threshold methodology. The Trailing Six-Month Maximum, Fixed After Triggered Threshold methodology flags 27.6% of transactions accounting for 37.7% of Dosage Units, 32.2% of MME and 37.2% of drug weight shipped into Cabell County and the City of Huntington, WV.

Figure 9 Trailing Six-Month Maximum, Fixed After Triggered Threshold Flagged Transactions, Cabell County and the City of Huntington, WV 1996 to 2018



112. Table 32 summarizes the transactions flagged based on the Trailing Six-Month Maximum, Fixed After Triggered Threshold Approach in Cabell County and the City of Huntington, WV.

Table 32 Trailing Six-Month Maximum, Fixed After Triggered Threshold Flagged Transactions, Cabell County and the City of Huntington, WV 1996 to 2018

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total
AmerisourceBergen Drug	9,322	8,668	1,284	22	930	289	20,515
Cardinal Health	32,413	13,121	1,958	32	820	238	48,582
McKesson Corporation	1,486	3,318	56	2	18	37	4,917
Total	43,221	25,107	3,298	56	1,768	564	74,014

C. Method 3: Twice Trailing Twelve-Month Average Pharmacy Dosage Units

113. Under the third approach, I identify transactions that cause the number of Dosage Units shipped by a Distributor Defendant to a pharmacy in a calendar month to exceed twice the trailing twelve-month average Dosage Units to retail and chain pharmacies served by the Distributor Defendant.

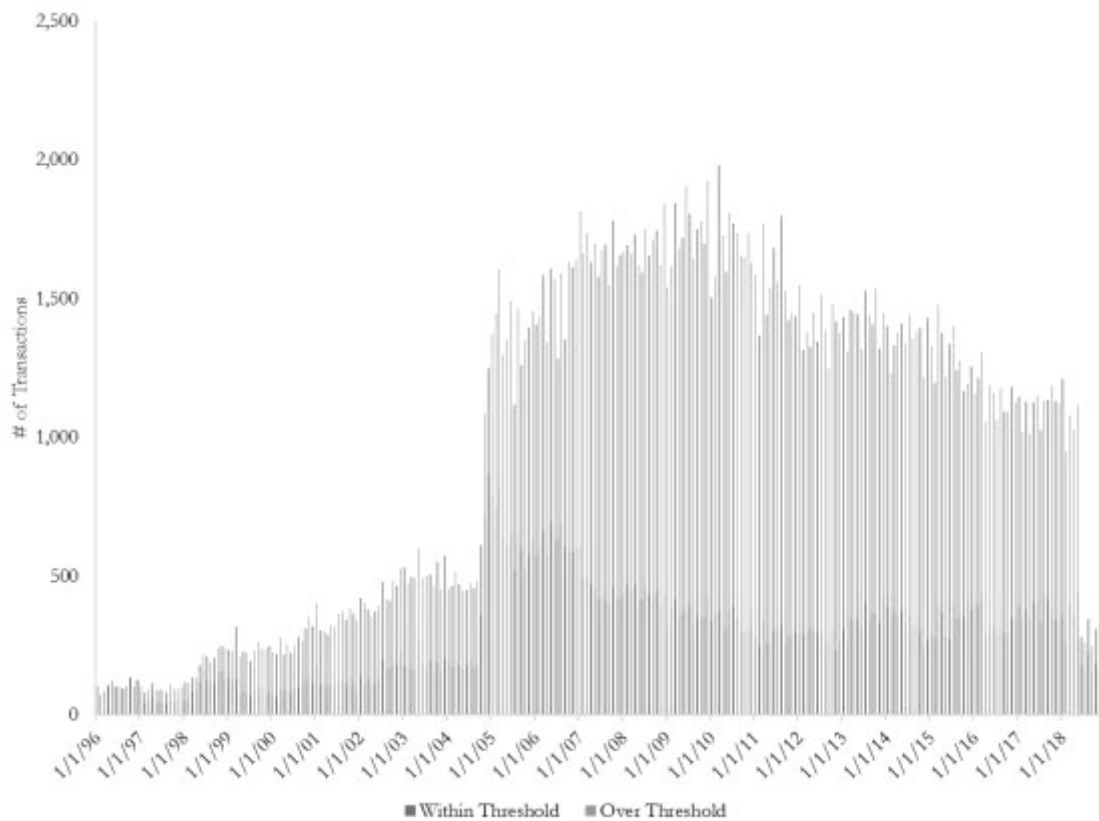
114. Table 33 reports Total MME and % of Total MME in transactions flagged in Cabell County and the City of Huntington, WV using the Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold.

Table 33 Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, Cabell County and the City of Huntington, WV, Total MME and % MME

Year	Defendants' Total MME	Flagged MME	%
1996	3,676,079	0	0.0%
1997	2,971,440	2,362,764	79.5%
1998	5,628,469	3,595,390	63.9%
1999	9,748,424	8,066,810	82.7%
2000	13,277,798	10,895,447	82.1%
2001	16,011,946	12,605,642	78.7%
2002	20,776,512	14,929,318	71.9%
2003	24,095,532	16,752,464	69.5%
2004	33,812,841	20,446,643	60.5%
2005	88,976,826	59,408,863	66.8%
2006	101,663,192	72,870,255	71.7%
2007	106,658,684	87,189,516	81.7%
2008	113,665,454	92,792,677	81.6%
2009	128,134,351	110,223,308	86.0%
2010	134,446,855	115,372,460	85.8%
2011	123,822,352	110,624,242	89.3%
2012	98,917,207	86,615,737	87.6%
2013	86,041,530	70,990,924	82.5%
2014	88,675,236	74,371,152	83.9%
2015	88,769,151	71,245,074	80.3%
2016	68,217,935	52,268,956	76.6%
2017	49,205,864	35,537,464	72.2%
2018	24,256,687	14,910,444	61.7%
Total	1,431,450,363	1,144,075,550	79.9%

115. Figure 10 illustrates total opioid transactions from Distributor Defendants to retail and chain pharmacies into Cabell County and the City of Huntington, WV from 1996 to 2018 and those transactions which would be flagged by the Twice Trailing Twelve-month Average Pharmacy Dosage Units methodology. The Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold methodology flags 70.5% of transactions accounting for 81.5% of Dosage Units, 79.9% of MME and 80.7% of drug weight shipped into Cabell County and the City of Huntington, WV.

Figure 10 Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, Cabell County and the City of Huntington, WV 1996 to 2018



116. Table 34 summarizes the transactions flagged based on the Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold in Cabell County and the City of Huntington, WV.

Table 34 Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, Cabell County and the City of Huntington, WV 1996 to 2018

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total
AmerisourceBergen Drug	23,363	35,026	4,422	746	2,566	7,340	73,463
Cardinal Health	39,553	33,354	8,576	1,693	3,096	17,819	104,091
McKesson Corporation	4,802	3,521	414	48	620	1,843	11,248
Total	67,718	71,901	13,412	2,487	6,282	27,002	188,802

D. Method 4: Three Times Trailing Twelve-Month Average Pharmacy Dosage Units

117. Under the fourth approach, I identify transactions that cause the number of Dosage Units shipped by a Distributor Defendant to a pharmacy in a calendar month to exceed three times the trailing twelve-month average Dosage Units to retail and chain pharmacies served by the Distributor Defendant.

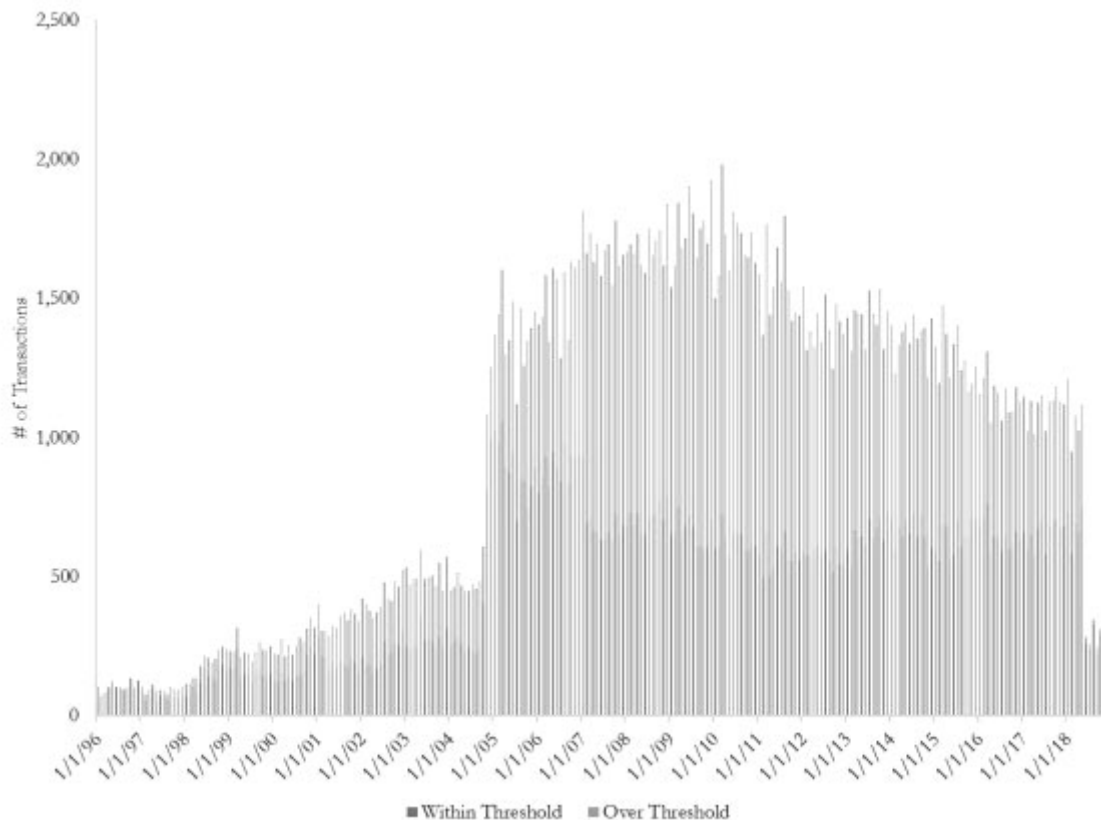
118. Table 35 reports Total MME and % of Total MME in transactions flagged in Cabell County and the City of Huntington, WV using the Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold.

Table 35 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, Cabell County and the City of Huntington, WV, Total MME and % MME

Year	Defendants' Total MME	Flagged MME	%
1996	3,676,079	0	0.0%
1997	2,971,440	2,047,426	68.9%
1998	5,628,469	3,105,597	55.2%
1999	9,748,424	6,189,206	63.5%
2000	13,277,798	9,170,847	69.1%
2001	16,011,946	10,202,920	63.7%
2002	20,776,512	13,154,352	63.3%
2003	24,095,532	14,075,836	58.4%
2004	33,812,841	17,308,963	51.2%
2005	88,976,826	43,529,339	48.9%
2006	101,663,192	51,470,923	50.6%
2007	106,658,684	72,005,547	67.5%
2008	113,665,454	75,272,916	66.2%
2009	128,134,351	89,607,725	69.9%
2010	134,446,855	95,224,357	70.8%
2011	123,822,352	94,590,943	76.4%
2012	98,917,207	68,093,595	68.8%
2013	86,041,530	50,535,583	58.7%
2014	88,675,236	49,750,851	56.1%
2015	88,769,151	47,351,026	53.3%
2016	68,217,935	32,428,136	47.5%
2017	49,205,864	22,093,552	44.9%
2018	24,256,687	7,733,058	31.9%
Total	1,431,450,363	874,942,698	61.1%

119. Figure 11 illustrates total opioid transactions from Distributor Defendants to retail and chain pharmacies into Cabell County and the City of Huntington, WV from 1996 to 2018 and those transactions which would be flagged by the Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold methodology. The Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold methodology flags 50.9% of transactions accounting for 63.6% of Dosage Units, 61.1% of MME and 62.5% of drug weight shipped into Cabell County and the City of Huntington, WV.

Figure 11 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, Cabell County and the City of Huntington, WV 1996 to 2018



120. Table 36 summarizes the transactions flagged based on the Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold in Cabell County and the City of Huntington, WV.

Table 36 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions, Cabell County and the City of Huntington, WV 1996 to 2018

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total
AmerisourceBergen Drug	17,165	28,049	2,226	247	2,210	3,904	53,801
Cardinal Health	25,932	28,187	6,978	736	2,314	13,915	78,062
McKesson Corporation	1,989	1,285	30	0	308	954	4,566
Total	45,086	57,521	9,234	983	4,832	18,773	136,429

E. Method 5: Maximum 8,000 Dosage Units Monthly

121. Under the fifth approach, I identify transactions that cause the number of Dosage Units shipped by a Distributor Defendant to a pharmacy in a calendar month to exceed 8,000 Dosage Units.³⁹

³⁹ McKesson Operations Manual for Pharma Distribution dated May 16, 2007 shows the dosage threshold of 8,000 on oxycodone or hydrocodone (MCK-WVAG-003-0001047, MCKMDL00355251).

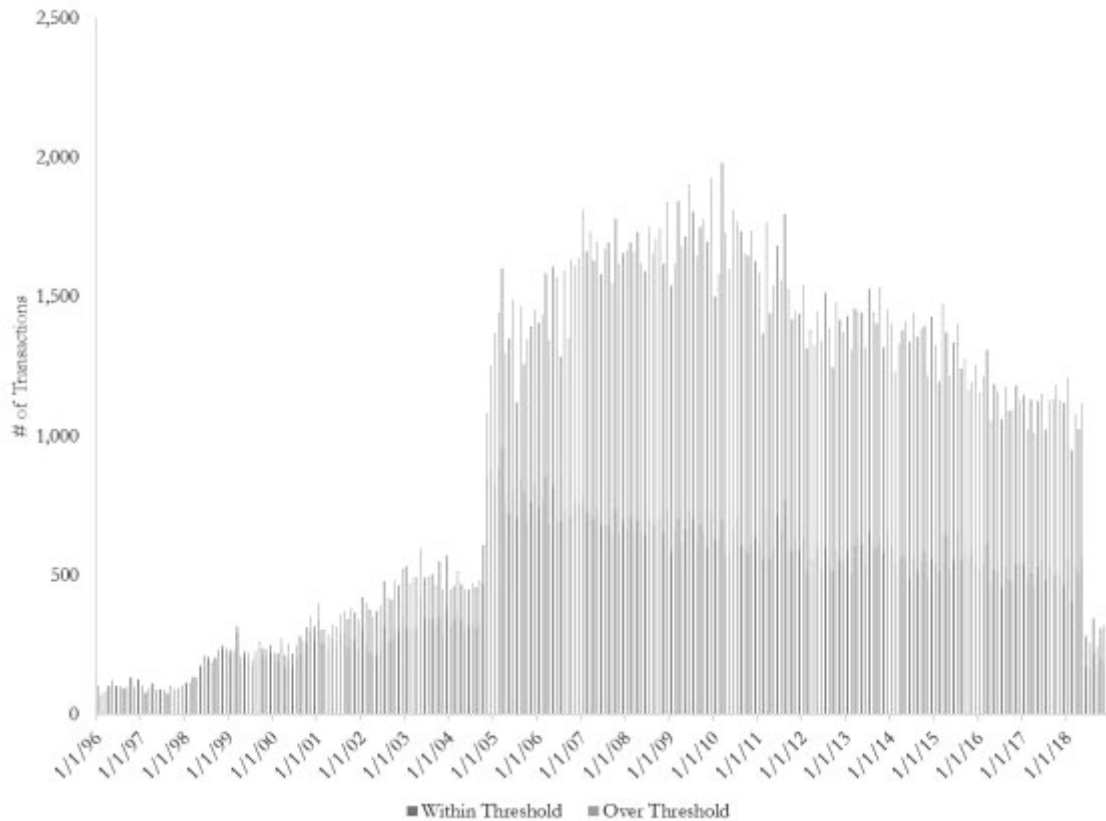
122. Table 37 reports Total MME and % of Total MME in transactions flagged in Cabell County and the City of Huntington, WV using the Maximum 8,000 Dosage Units Monthly Threshold.

Table 37 Maximum 8,000 Dosage Units Monthly Threshold Flagged Transactions, Cabell County and the City of Huntington, WV, Total MME and % MME

Year	Defendants' Total MME	Flagged MME	%
1996	3,676,079	82,531	2.2%
1997	2,971,440	57,668	1.9%
1998	5,628,469	137,467	2.4%
1999	9,748,424	2,107,662	21.6%
2000	13,277,798	3,246,199	24.4%
2001	16,011,946	4,139,172	25.9%
2002	20,776,512	8,376,490	40.3%
2003	24,095,532	9,361,409	38.9%
2004	33,812,841	11,460,331	33.9%
2005	88,976,826	42,778,692	48.1%
2006	101,663,192	56,120,423	55.2%
2007	106,658,684	63,593,810	59.6%
2008	113,665,454	67,861,342	59.7%
2009	128,134,351	83,984,882	65.5%
2010	134,446,855	86,737,762	64.5%
2011	123,822,352	76,330,784	61.6%
2012	98,917,207	62,738,809	63.4%
2013	86,041,530	49,967,716	58.1%
2014	88,675,236	54,842,075	61.8%
2015	88,769,151	56,247,880	63.4%
2016	68,217,935	41,881,116	61.4%
2017	49,205,864	28,280,472	57.5%
2018	24,256,687	12,406,513	51.1%
Total	1,431,450,363	822,741,206	57.5%

123. Figure 12 illustrates total opioid transactions from Distributor Defendants to retail and chain pharmacies into Cabell County and the City of Huntington, WV from 1996 to 2018 and those transactions which would be flagged by the Maximum 8,000 Dosage Units Monthly Threshold methodology. The Maximum 8,000 Dosage Units Monthly Threshold methodology flags 52.7% of transactions accounting for 78.0% of Dosage Units, 57.5% of MME and 68.4% of drug weight shipped into Cabell County and the City of Huntington, WV.

Figure 12 Maximum 8,000 Dosage Units Monthly Threshold Flagged Transactions, Cabell County and the City of Huntington, WV 1996 to 2018



124. Table 38 summarizes the transactions flagged based on the Maximum 8,000 Dosage Units Monthly Threshold Approach in Cabell County and the City of Huntington, WV.

Table 38 Maximum 8,000 Dosage Units Monthly Threshold Flagged Transactions, Cabell County and the City of Huntington, WV 1996 to 2018

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total
AmerisourceBergen Drug	23,006	41,230	0	0	635	0	64,871
Cardinal Health	37,293	29,845	0	0	0	957	68,095
McKesson Corporation	4,294	3,858	0	0	0	0	8,152
Total	64,593	74,933	0	0	635	957	141,118

F. Method 6: Maximum Daily Dosage Units

125. Under the sixth approach, I identify transactions that cause the number of Dosage Units shipped by a Distributor Defendant to a pharmacy in a day to exceed a specified number of Dosage Units that varies by drug type and within some drug types by formulation.⁴⁰

⁴⁰ Maximum Daily Dosage Units used as specified in CAH_MDLPRIORPRO_DEA07_01384160.

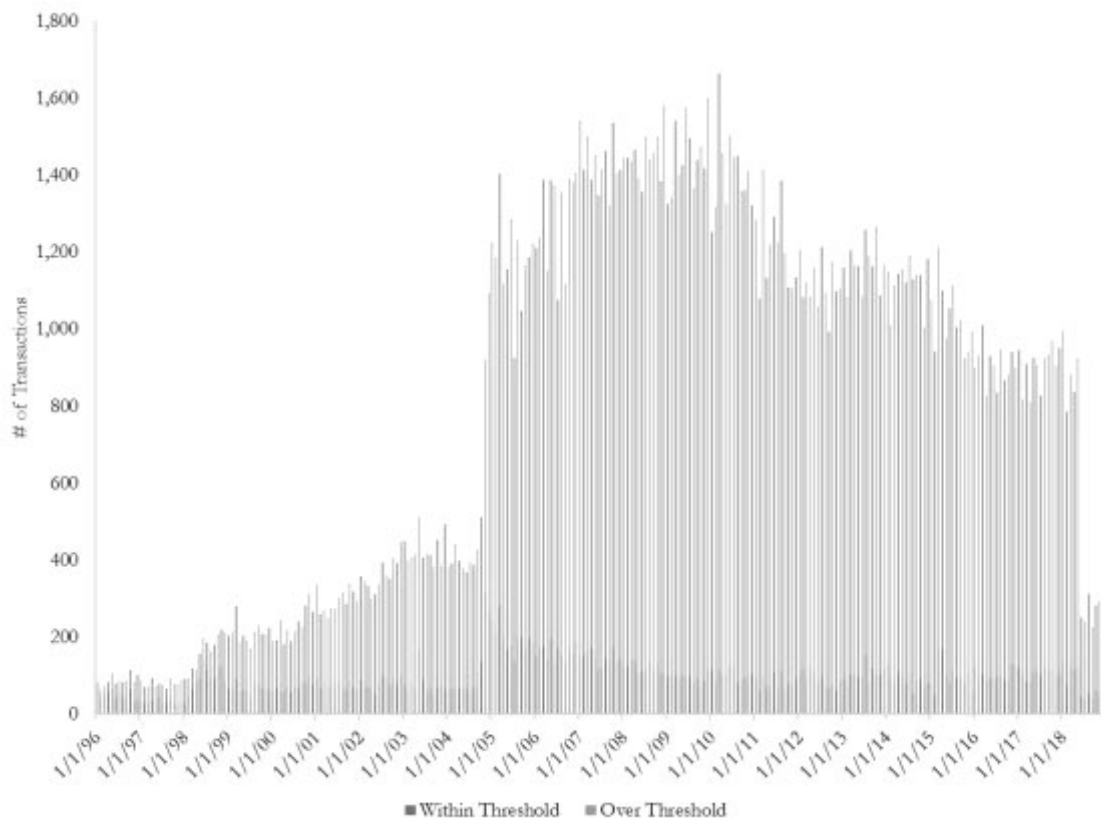
126. Table 39 reports Total MME and % of Total MME in transactions flagged in Cabell County and the City of Huntington, WV using the Maximum Daily Dosage Units Threshold.

Table 39 Maximum Daily Dosage Units Threshold Flagged Transactions, Cabell County and the City of Huntington, WV, Total MME and % MME

Year	Defendants' Total MME	Flagged MME	%
1996	2,519,961	1,574,927	62.5%
1997	2,413,289	2,104,427	87.2%
1998	4,222,541	2,823,792	66.9%
1999	7,826,526	6,504,370	83.1%
2000	10,487,500	8,981,926	85.6%
2001	11,927,688	10,214,757	85.6%
2002	15,376,605	13,946,810	90.7%
2003	17,556,749	16,313,422	92.9%
2004	24,014,632	21,346,116	88.9%
2005	67,920,944	63,805,660	93.9%
2006	78,868,523	75,081,191	95.2%
2007	81,618,726	78,656,011	96.4%
2008	86,711,380	84,412,142	97.3%
2009	100,055,902	98,287,999	98.2%
2010	101,300,482	98,876,182	97.6%
2011	88,085,792	86,813,965	98.6%
2012	71,590,543	69,902,950	97.6%
2013	63,136,525	61,230,957	97.0%
2014	66,036,736	64,073,295	97.0%
2015	67,531,414	65,620,692	97.2%
2016	50,460,085	48,684,671	96.5%
2017	35,801,386	34,469,580	96.3%
2018	18,755,215	17,385,450	92.7%
Total	1,074,219,144	1,031,111,294	96.0%

127. Figure 13 illustrates total opioid transactions from Distributor Defendants to retail and chain pharmacies into Cabell County and the City of Huntington, WV from 1996 to 2018 and those transactions which would be flagged by the Maximum Daily Dosage Units Threshold methodology. The Maximum Daily Dosage Units Threshold methodology flags 88.0% of transactions accounting for 96.1% of Dosage Units, 96.0% of MME and 93.1% of drug weight shipped into Cabell County and the City of Huntington, WV.

Figure 13 Maximum Daily Dosage Units Threshold, Any Order Subsequent to a Flagged Transaction, Cabell County and the City of Huntington, WV 1996 to 2018



128. Table 40 summarizes the transactions flagged based on the Maximum Daily Dosage Units Threshold Approach in Cabell County and the City of Huntington, WV.

Table 40 Maximum Daily Dosage Units Threshold Flagged Transactions in Cabell County and the City of Huntington, WV 1996 to 2018

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total
AmerisourceBergen Drug	30,063	43,951	5,601	1,059	n/a	724	81,398
Cardinal Health	47,440	37,183	8,936	1,395	n/a	2,092	97,046
McKesson Corporation	8,014	7,838	1,412	75	n/a	48	17,387
Total	85,517	88,972	15,949	2,529	n/a	2,864	195,831

VIII. Charts and Reports

129. I have created additional Excel Macro and diagnostic tools, which allow the overlay of selected orders upon the ARCOS data and/or Defendants' Transactional Data and provide the ability to sort, compare, and view the order history of an individual pharmacy. These macros and diagnostic tools are being provided with this report.

130. In Appendix 8 I have created a map illustrating the location of Cabell County (red) and the City of Huntington (yellow), along with the zip code 257** and 255** that covers the entire area.⁴¹

⁴¹ Source: www.zeemaps.com